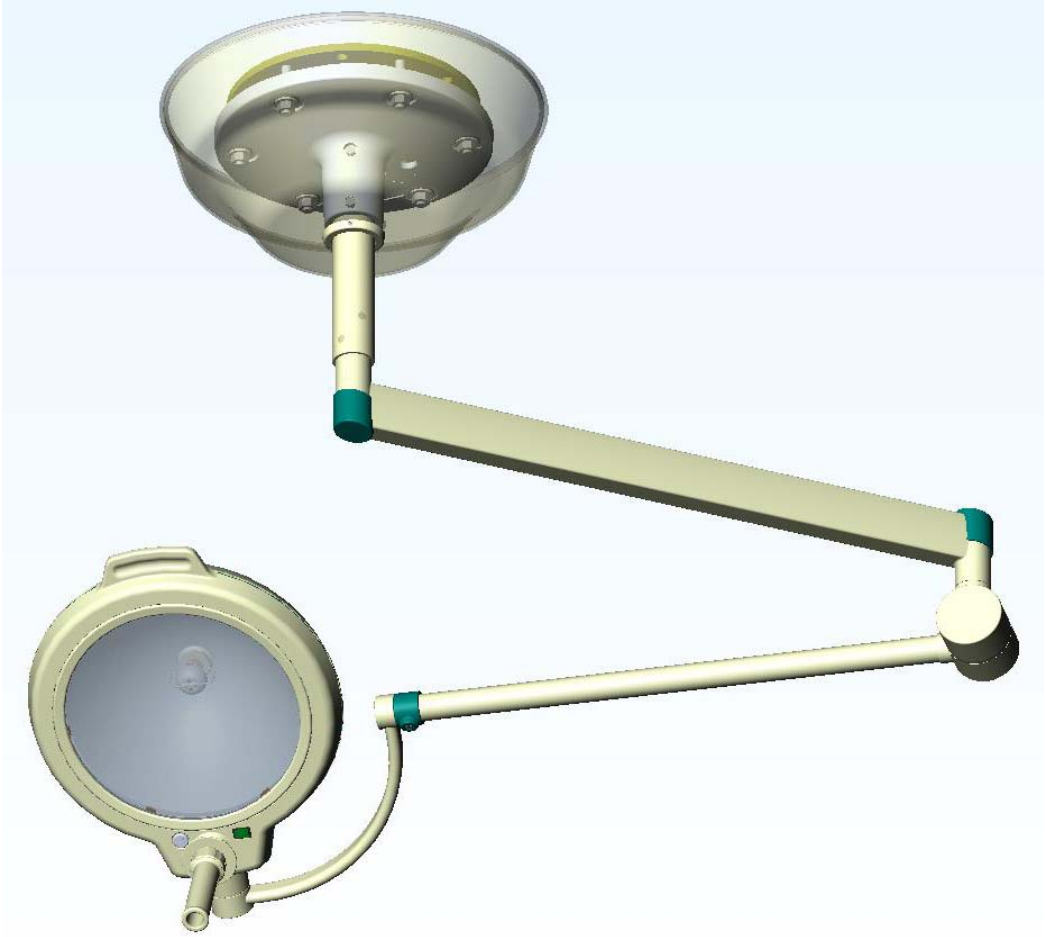
# Mounting instructions Directions for use

# *CEILING ATTACHMENT FOR MACH M2*



**Ceiling lamps:**

| | |
|---|---|
| Mach M2..... | Order No. 170 120 3330 |
| Mach M2 F..... | Order No. 170 230 3330 |

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# Static inspection

**Note:**
**The static (structural) inspection must be carried out before the installation of the ceiling or wall anchorage!**

- The strength of the construction must be designed, checked and certified by a structural engineer.
- The respective regional construction regulations that apply must be followed.
- If a wrong hole is drilled by mistake, e.g. drilling of a reinforcement rod, the structural engineer who is responsible must be contacted, since adequate static load distribution in the ceiling may have been endangered.

**Declaration of acceptance:**
It is hereby certified that the supporting ceiling / wall and the ceiling anchoring / wall anchoring is safe and adequately strong.

**Project:** _____

_____

_____

**Anchoring** (please check the one that is applicable)

- with dowels authorized by construction authority ☐
- with counter-plate ☐
- other ☐

**Location**: _____

**Signature / Stamp: (structural engineer / construction authority)**

# 1. Safety instructions

**The lamp must not be connected to the mains, until it has been fully assembled and installed. This device is not suitable for use in hazardous locations.**

**The devices are not suitable for use in combustible blends of anaesthesia agents with oxygen or nitrous oxide.**
**Repairs to the ceiling attachment and special installation work on the sliding contacts should only be carried out by ourselves or a company expressly authorised by ourselves.**

**The manufacturer is only responsible for operational safety of the ceiling attachment when repairs and modifications are carried out by his own staff or by persons who guarantee compliance with the safety regulations.**

**The manufacturer is not responsible for damage to persons or property caused by incorrect or improper use, or when used for incorrect purposes.**

## General information

**These installation instructions must be kept at hand together with the relevant operating instructions for consultation at any time.**

All Dr. Mach lamps are supplied with a flange with a graduated circle diameter 270mm and six bores diameter 15mm. The flange supports the vertical suspension tube. It is attached to the solid ceiling by means of a ceiling anchorage ring.
**Remark: The ceiling anchorage ring has to be ordered separately!**

The ceiling anchorage ring has six precisely positioned threaded bolts M12. It makes it possible to fasten and adjust the lamp without causing dust or dirt after all building work has been completed. The use of a ceiling anchorage ring is necessary in all cases of ceiling attachments.

During mounting, take care to ensure that neither the flange nor the attachment elements are in contact with reinforcement components of the solid ceiling.

In view of the slight weight of the Dr. Mach lamps, it is not fundamentally necessary to drill through the ceiling and use a counter-plate. Ceiling anchorage rings can be attached without any problems to ceilings in the concrete strength class greater than or equal to B25, using safety dowels M8.

The forces arising when the widely extending articulated arms tilt, do make it necessary to drill very carefully with a certified hammer drill, paying close attention to the drilling tolerances.

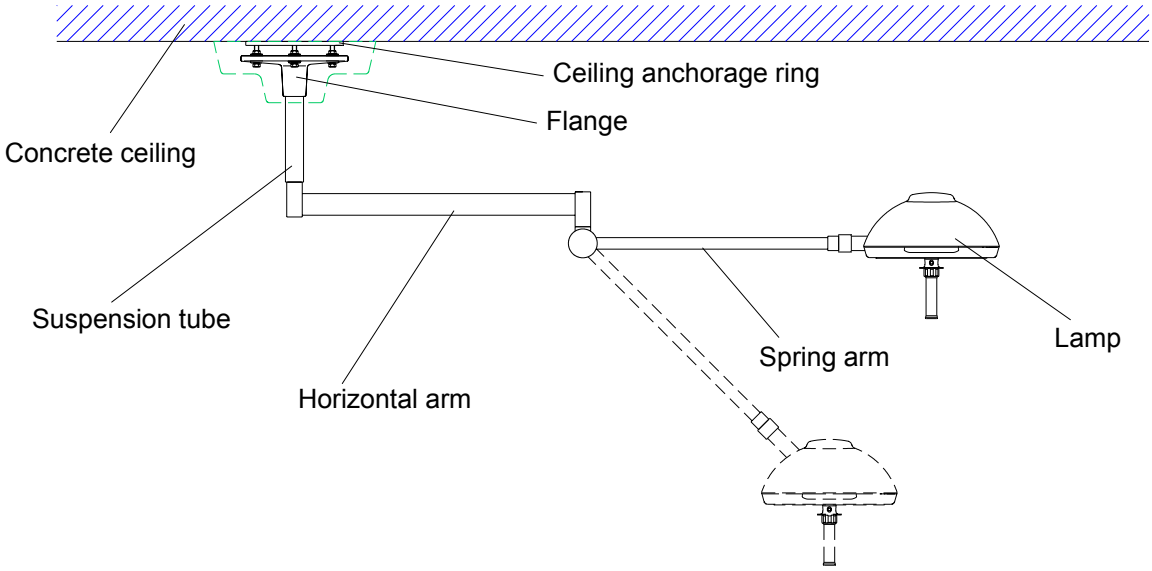
The suspension tube of the lamp must be adjusted vertically to prevent the lamp body from moving. For this purpose the M12 counter nuts on the attaching bolts must be adjusted accordingly.

In case of false ceilings, the suspension tubes for all lamps can be mounted directly through to the solid ceiling. The opening required for this purpose can be closed once the work has been completed, using the canopy diameter 450mm or a covering plate.

When using an intermediate flange (preferably for spaces exceeding 400mm and for room heights exceeding 4050mm), the length of the intermediate flange is to be measured to the lower edge of the false ceiling.
Also in this case a ceiling anchorage ring has to be used for fixation.

# 2. Mounting layout ceiling lamps

**Mach M2; Mach M2 F**



# 3. Ceiling attachment

## 3.1 Preparatory work on the ceiling

### 3.1.1 Setting the safety dowels

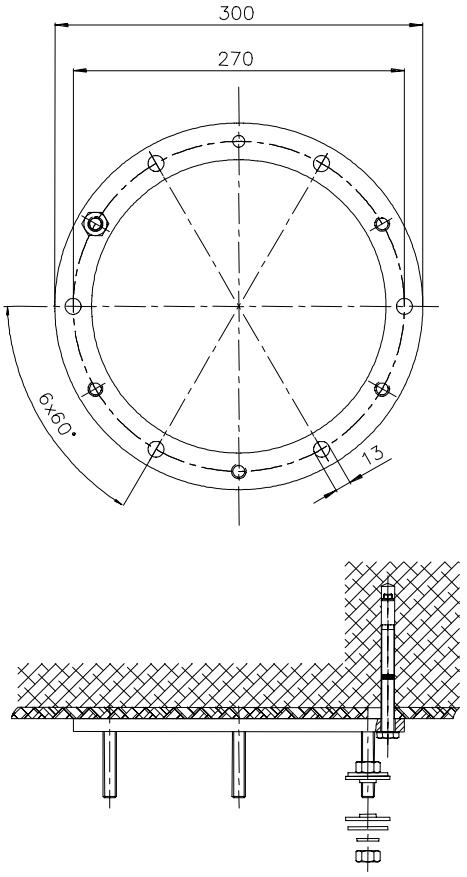
**Attention:**

**Lamps, ceiling anchorage rings and intermediate flanges may only be attached to a ceiling of concrete strength class greater than or equal to B25. In case of light-weight ceiling coverings, the dowel anchor must be sunk completely into the concrete. To bridge this space use long threaded bolts for attaching the ceiling tube.**

**In addition, take care that neither suspension tube nor attaching elements come into contact with reinforcement components of the solid ceiling.**

**The lamp weight and the tilt of the long articulated arm(s) require that this work is performed meticulously. This refers particularly to the use of a certified hammer drill and to observe the drilling tolerances.**

### 3.1.2 Mounting the ceiling anchorage ring to the solid ceiling




The scope of supply includes:
1 attachment set, consisting of:

- Six safety dowels Fischer FHA 12/50 galZn
- Mounting data Fischer
- Bore template

To attach the ceiling anchorage ring to a solid ceiling proceed as follows:

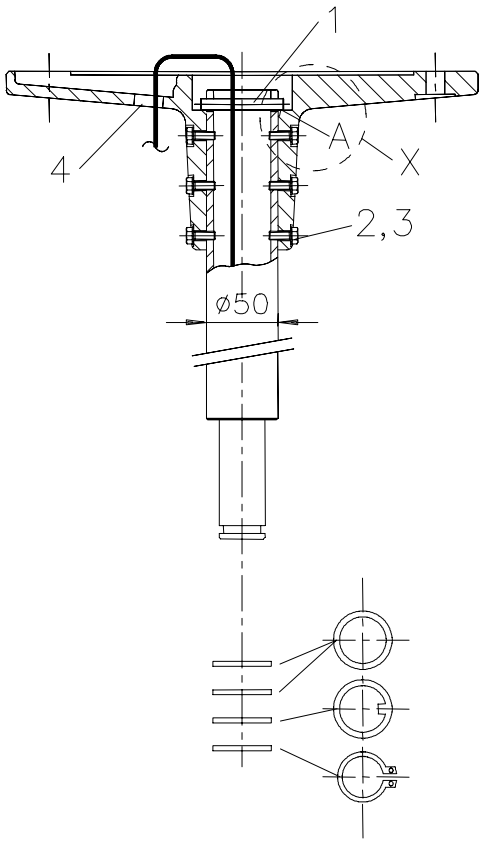
- Drill the bore holes according to the figure diameter 12mm and at least 100mm deep with a certified hammer drill, using the enclosed bore template. You can also use the ceiling anchorage ring as a template. In this case a second person may be needed to assist.
- Insert the safety dowels through the bores of the ceiling anchorage ring in such a way, that the washers lie flat to the ring.
- Tighten the screws carefully using a torque wrench (25Nm).

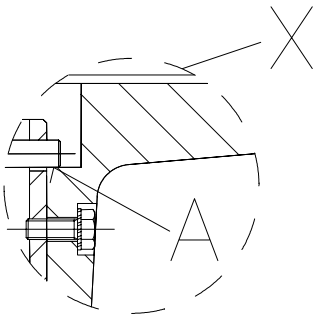
Light-weight ceiling panelling with a maximum thickness of 30mm can be bridged using the enclosed safety dowels. For panelling thicker than 30mm, it is necessary to remove the panelling before mounting.

## 3.2 Pre-assembly of the ceiling flange and suspension tube
### and installing the electrical connections

The length of the suspension tube is adjusted to the required room height with a clearance height of at least 200cm under the lamp.

### Aluminium cast flange and suspension tube ∅ 50mm




**Standard version**

For pre-assembly of ceiling flange and suspension tube proceed as follows:

- Cable or cord showing out the suspension tube is to be pushed carefully into the ceiling flange together with the suspension tube.
- Push the suspension tube upwards until the safety pin **1** can be pushed through the cross bores of the suspension tube.
- Then pull the suspension tube down until the safety pin **1** lies in recess **A** of the ceiling flange.
- Then secure the connection with six screws **2** and washers **3** to prevent wobbling.
  If not possible, turn suspension tube by 180°.
- Pull the cable or cord through the bore **4** as shown in the diagram.

**Attention:**

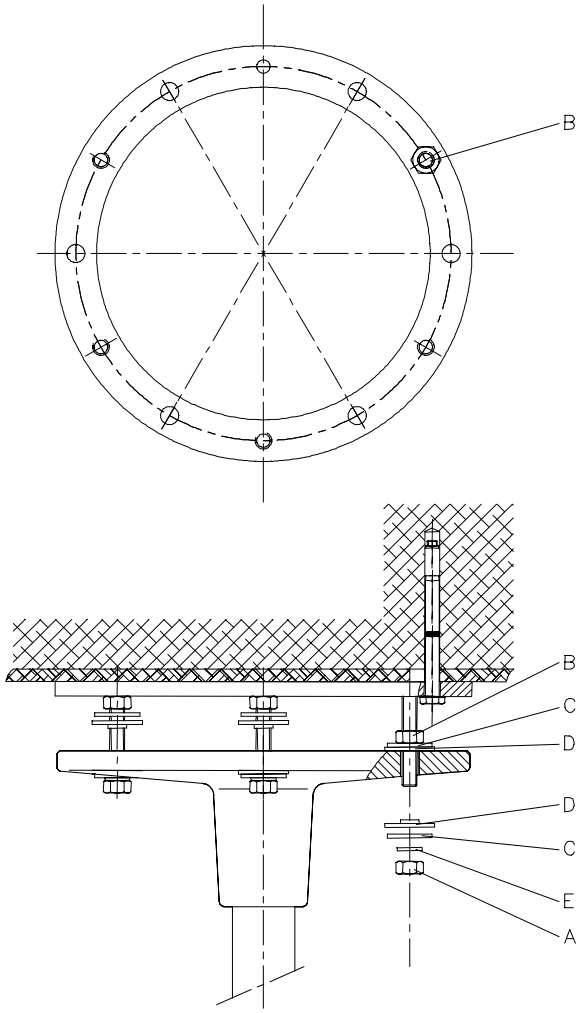
**The suspension tube is delivered with premounted retaining ring for the ceiling canopy.**

**Each connection journal is also equipped with:**

- **2 spacer rings;**
- **1 gib ring;**
- **1 circlip (Seegerring).**

## 3.3 Mounting the flange and suspension tube to the ceiling

Before mounting the flange and the suspension tube, assembly work on the ceiling (setting the dowels or mounting the ceiling anchorage ring and possibly mounting the intermediate flange) must be completed and all pre-assembly work finished.



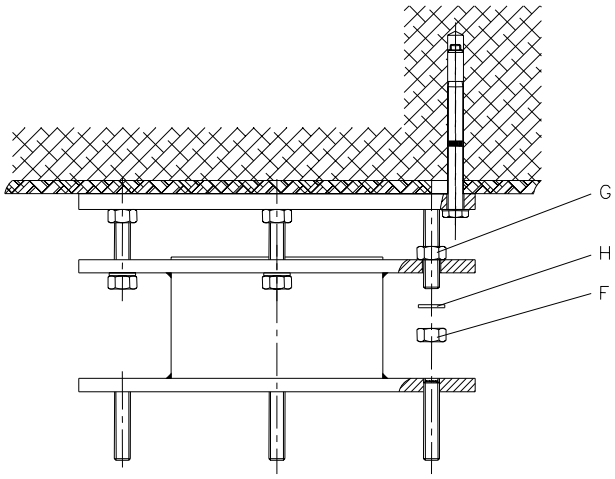

**Type with ceiling anchorage ring**

- Screw three nuts **B** (each 120°) to the plate of the ceiling anchorage ring, holding the other three nuts 0,5cm away from the plate, unscrew nuts **A**.
- Position six washers **C** and six insulating washers **D** on the flange.
- Position the flange with suspension tube on the threaded bolts and adjust it to the required height using three nuts **A** and washers **C**, insulating washers **D**, and retaining washers **E** (each 120°).
  **Note: Washers C, insulating washers D and retaining washers E must be put on the flange in the same order as shown in the figure.**
- The three-point mounting allows a simple vertical adjustment of the suspension tube.

**Vertical adjustment is very important and must be carried out with great care.**

If the flange with suspension tube is not in the correct vertical setting, the support arms of the lamp do not remain precisely in the proper position, they could turn away and would therefore require excessive braking.

- Then position from above all six nuts **B** gently against the flange.
- Screw on the remaining three nuts **A** with washers **C**, insulating washers **D** and retaining washers **E** and tighten all six nuts equally cross-wise with a torque wrench (25 Nm).
  **Note: Washers C, insulating washers D and retaining washers E must be put on the flange in the same order as shown in the figure.**
- Verify balance with a spirit-level.



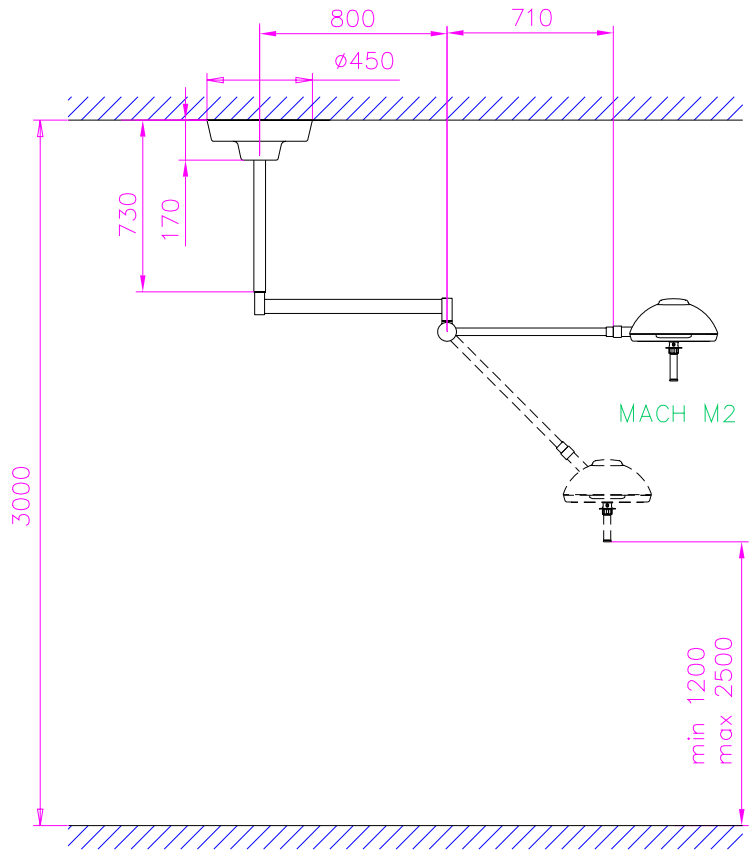

**Type with ceiling anchorage ring and Intermediate flange**

- Screw three nuts **G** (each 120°) to the plate of the ceiling anchorage ring, the other three 1cm away from the plate, unscrew nuts **F**.
- Position the intermediate flange on the threaded bolts and adjust it to the required height using three nuts **F** and washers **H**.
- Then position all six nuts **G** gently against the intermediate flange from above.
- Screw on the remaining three nuts **F** with washers **H** and tighten all six nuts equally cross-wise with a torque wrench (25 Nm).
- Verify balance with a spirit-level.

**For mounting the flange to the intermediate flange proceed as described at the design with ceiling anchorage ring.**

## 3.4 Minimum room heights for ceiling attachments

**Mach M2; Mach M2 F**



**Room heights H – single ceiling lamps**

| Lamps | Hmin* depending on ceiling attachment |
|---|---|
| Mach M2 | 2420 |
| Mach M2 F | 2420 |

* Min. room height in the case of ceiling attachment with shortest suspension tube (180mm) for a passing height of 2 meters

# 4. Electrical connection

## 4.1 Preparing the electrical connection

**Extent of supply:**
- **Cable on the suspension tube**
- **Line clamps on the flange**

Put the cable through the flange. Ensure that the cables are cut to a length which allows approx. 15cm cable to extend from the suspension tube.

The flange is fitted with line clamps for connecting the light system to the electrical circuit. These clamps should be accessible for electrical safety checks during installation and also later.
Connect the mains supply and the cable from the suspension tube to the line clamps.

**In case of lamps with external transformer the cross-sections of the cables must be designed in accordance to the cable-length and power consumption.**
The following table shows the recommended cross-sections:

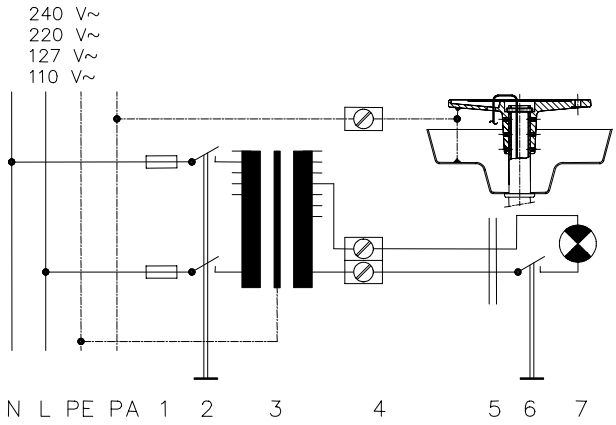
| Power consumption [W] | Lead length [m] | | | |
|---|---|---|---|---|
| | up to 10 | up to 20 | up to 40 | up to 70 |
| 80 | 2,5 | 4 | 10 | 16 |
| | Cross-section of lead [$mm^2$] | | | |

Once the electrical connections have been completed, check that the system functions correctly in a no-load operation trial run.
When connecting to an external transformer, the emerging voltage U will be approx. 10-20% above rated voltage because of no load and anticipated lead losses. There is no point in making any adjustments until the lamps have been completely mounted.

## 4.2 Position of transformer – Dr. Mach lamps

| Lamps | External transformer | Transformer in the lamp housing | Remark |
|---|---|---|---|
| Mach 120 / 120F | X* | | Inside the wall bearing |

## 4.3 Wiring diagrams



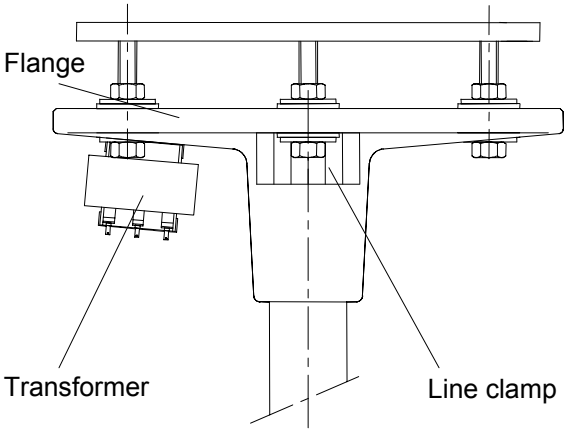

**External transformer (Mach 120 / Mach 130)**

1. Fuses
2. ON/OFF switch (4-pole for emergency power connection)
3. Transformer
4. Clamps on the flange
5. Coupling with sliding contact on lamp
6. Secondary ON/OFF switch
7. Light bulb

## 4.4 Ceiling lamps with external transformer

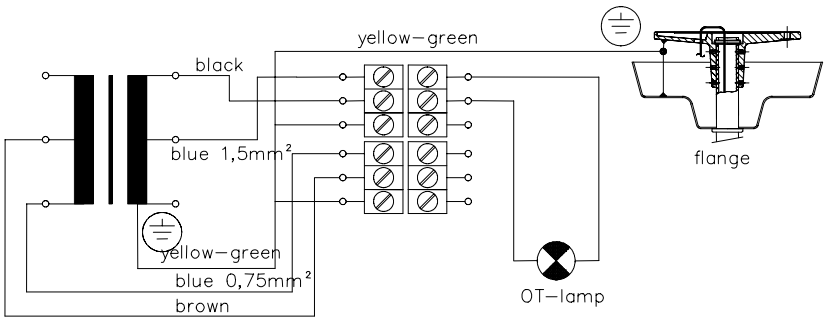
### Single-phase transformer mounted on the flange

**View**



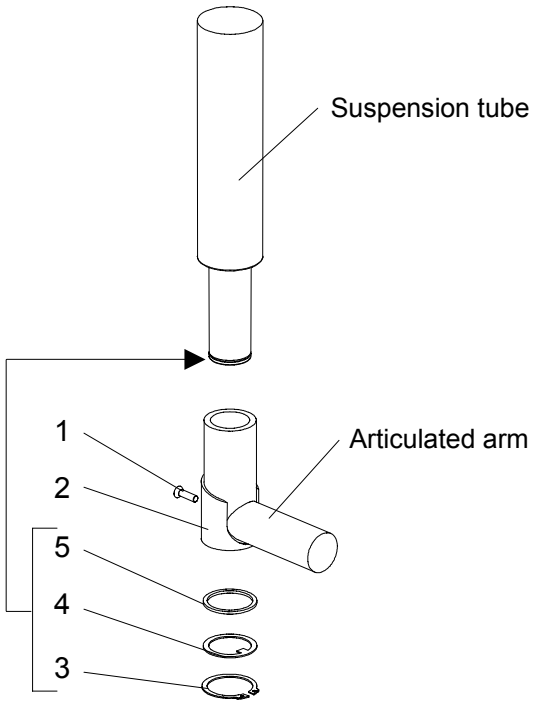

The single-phase transformer is already mounted on the flange.
At delivery it is already connected to the line clamp. You have to connect the power supply and the lamp to the line clamp (see wiring).

**Wiring**



# 5. Mounting the articulated arms and the lamp head

## 5.1 Mounting the articulated arms to the suspension tube

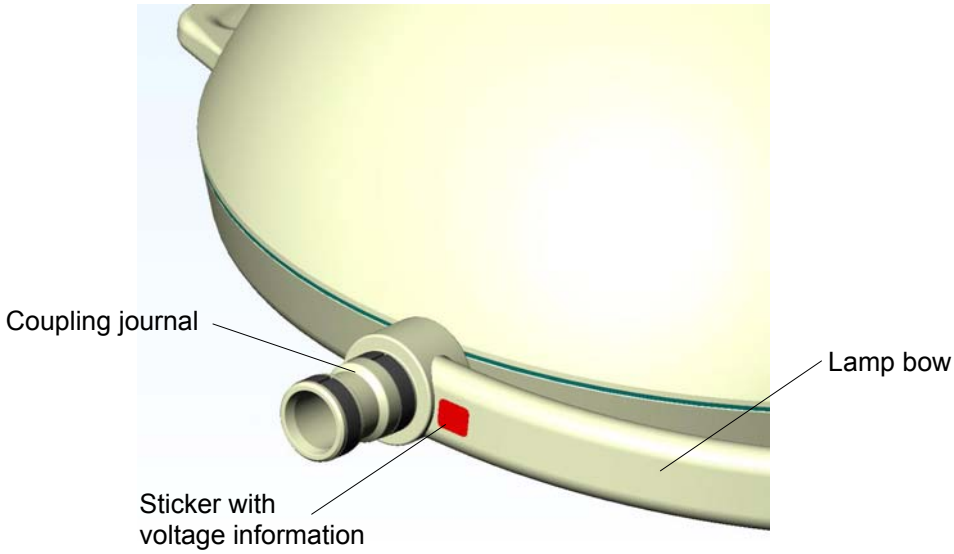



To mount the articulated arms proceed as follows:

- Loosen the screw **1**.
- Remove cover **2** including the sliding contact-plug.
- Remove circlip **3**, gib washer **4** and levelling washer **5** from the suspension tube (tool: mounting plier).
- Slide the articulated arm onto the suspension tube.
- Slide the levelling washer, gib washer and circlip onto the suspension tube in the correct order.
  Take care to ensure that the nose of the gib washer lies on the lateral bore (not shown) of the suspension tube, and that the safety ring slots properly into the groove of the suspension pipe (tool: mounting plier).
- Place the cover **2** back on the articulated arm and screw on with screw **1**.

## 5.2 Mounting the lamp to the spring arm

**ATTENTION! Notice the rated voltage information!**




**Each lamp has a red sticker applied near the coupling journal at the lamp bow. The sticker shows the rated voltage of the lamp.**
**Connect the lamp only to the prescribed voltage, to avoid irreparable damage (e.g. the electrical components).**

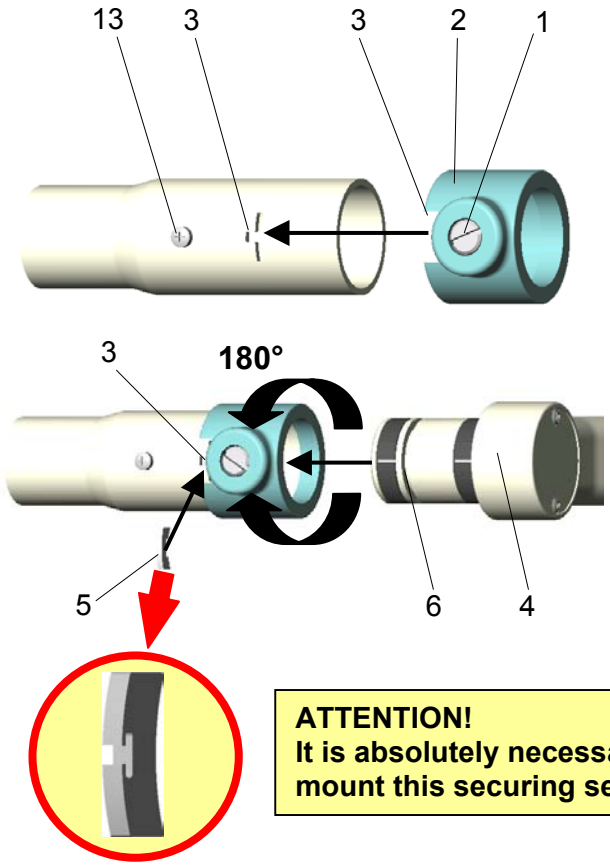
Following rated voltage is usual:

***22,8 V***

**After mounting the lamp take off the sticker and dispose it, otherwise it could fall down in the OT-field after some time!**

**Do not remove screw 13, it is designed to fix the sliding contact and provides earthling!**

**Attention: If the spring arm is pushed downwards (the arm is under spring tension) it may bounce up and cause harm. While mounting the lamp head no other persons are allowed to be within the swivel range of the spring arm.**




**ATTENTION!**
**It is absolutely necessary to mount this securing segment!**

**Mounting the lamp Mach M2 / M2F to the spring arm**

- Loosen brake screw **1**, so the plastic bushing **2** can be slipped easy onto the spring arm.
- Slip plastic bushing **2** onto the spring arm to overlap slots **3**.
- Check if the journal **4** of the lamp is greased.
- Insert the greased journal **4** of the lamp and insert security segment **5** completely into slot **3**, that the security segment leads in groove **6**.
- Rotate plastic bushing **2** by 180° **up to the provided drilling for the brake screw** and screw in brake screw **1** until you reach the desired brake effect for lamp head **4**.
- Check if lamp head **4** is firmly fixed.

# 6. Cleaning

**Note: Before doing any cleaning work turn off the lamp, disconnect from mains and make sure that the lamp cannot be switched on again.**
Please ensure, that no disinfection liquid flows into the joints or lamp head.

The surface of the ceiling attachment can be easily kept clean by simply wiping with a wet cloth. You can use conventional cleaning agents.

**Caution:**
In order to prevent any damage at plastic parts, do not use **scouring agents or alkaline, acidic and alcoholic cleaning agents**.

For cleaning proceed as follows:

- Draw plug from mains.
- Wipe the surface of the ceiling attachment with a wet cloth. As a cleaning agent you can use water or a soap solution (washing-up liquid).

# 7. Maintenance

**Note: Before doing any maintenance work, turn off the lamp, disconnect from mains and make sure, that the lamp cannot be switched on again.**

## 7.1 Periodical maintenance work

The following maintenance work / tests has / have to be done every six months:
- check on defects in paint work;
- check on fissures at plastic parts;
- check on deformation of the suspension.

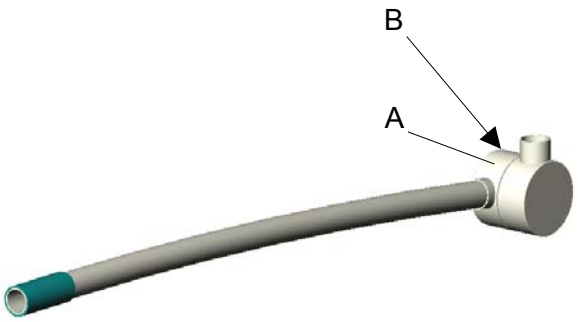
The following maintenance work / tests has / have to be done once a year:
- check the function;
- electrical safety test;
- check the suspension.

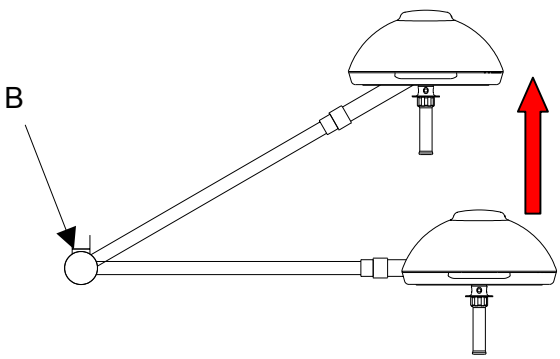
**Remark:**
**Check and grease the security segment once a year.**

## 7.2 Adjusting the spring force

Springs are wearing parts, thus the spring force can decrease in time and must be readjusted.

**Note: Set the spring force in such a way, that the spring arm with the lamp head holds its position at every set height.**




**In case the spring arm with the lamp <u>moves down</u> on its own, proceed as follows:**
- Remove lateral cover **A**. The adjusting screw (**B**) for the spring force is visible now.
- Push the lamp and spring arm upwards as much as possible, so the spring is without charge.
- Insert a slotted screwdriver into the screw **B**.
- Turn the adjusting screw **to the left** (anticlockwise), until the lamp holds its position at every set height.

**In case the spring arm with the lamp <u>moves up</u> on its own, proceed as follows:**
- Remove lateral cover **A**. The adjusting screw (**B**) for the spring force is visible now.
- Push the lamp and spring arm upwards as much as possible, so the spring is without charge.
- Insert a slotted screwdriver into the screw **B**.
- Turn the adjusting screw **to the right** (clockwise), until the lamp holds its position at every set height.

## 7.3 Maintenance of the segment

- Dismount the lamp head in reverse order of mounting (see chapter 5.2).
- Check the thickness of the segment. It must be at least 1,5mm. In case the thickness of the segment is less than 1,5mm, it has to be changed.
- Grease the segment and the coupling journal of the lamp.
- Mount the lamp to the spring arm (see chapter 5.2).

# 8. Data

## 8.1 Technical data

| | Ceiling attachment |
|---|---|
| Primary voltage | 230V |
| Secondary voltage | 22,8 V |
| Frequency | 50 / 60Hz |
| Power consumption | 80W |
| Rated current at 24V | 3,3A |
| Protection class | I. |

The device is not suitable for use in combustible blends of anaesthesia agents with air or for use in combustible blends of anaesthesia agents with oxygen or nitrous oxide.
The device is designed for continuous operation.

## 8.2 Environmental conditions

**Operation**

| | Min. | Max. |
|---|---|---|
| Temperature | +10°C | +40°C |
| Relative atmospheric humidity | 30% | 75% |
| Air pressure | 700hPa | 1060hPa |

**Transport / storage**

| | Min. | Max. |
|---|---|---|
| Temperature | +10°C | +40°C |
| Relative atmospheric humidity | 30% | 75% |
| Air pressure | 700hPa | 1060hPa |

# 9. Disposal

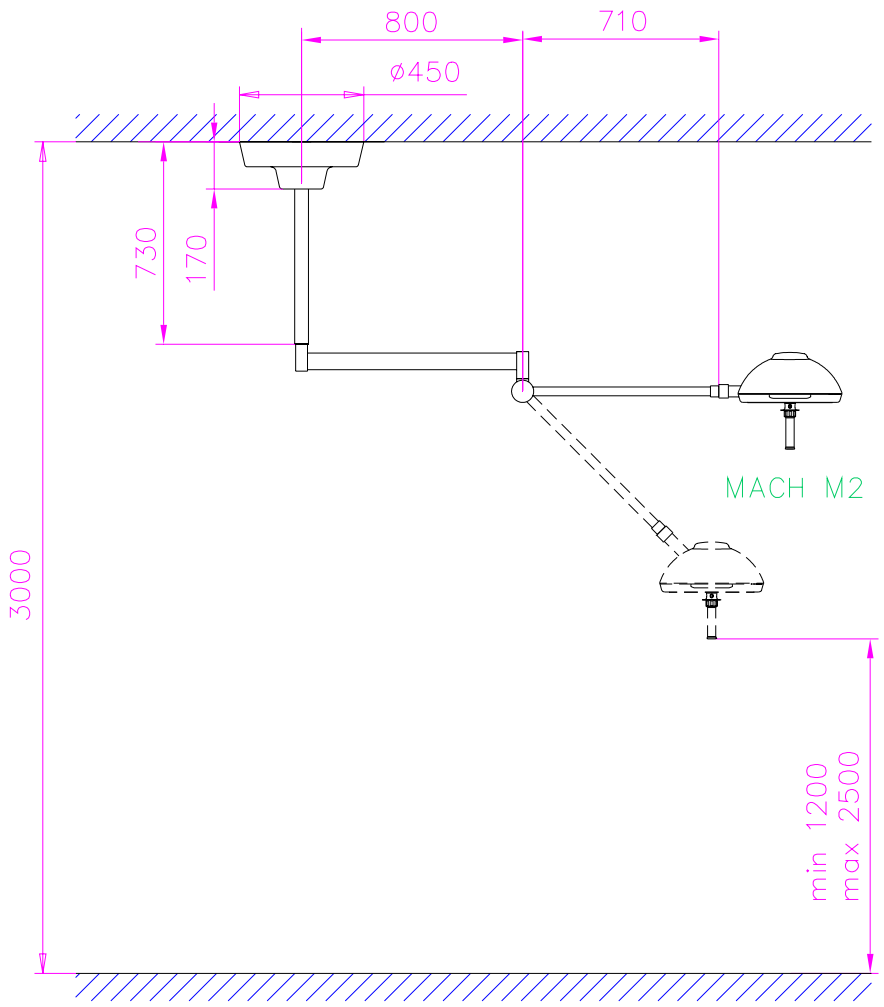
The ceiling attachments do not contain any danger goods.
The components of the ceiling attachment should be properly disposed at the end of its shelf life. In order to respect all regulations for disposal, please contact us before disposing the product.

# 10. CE- mark

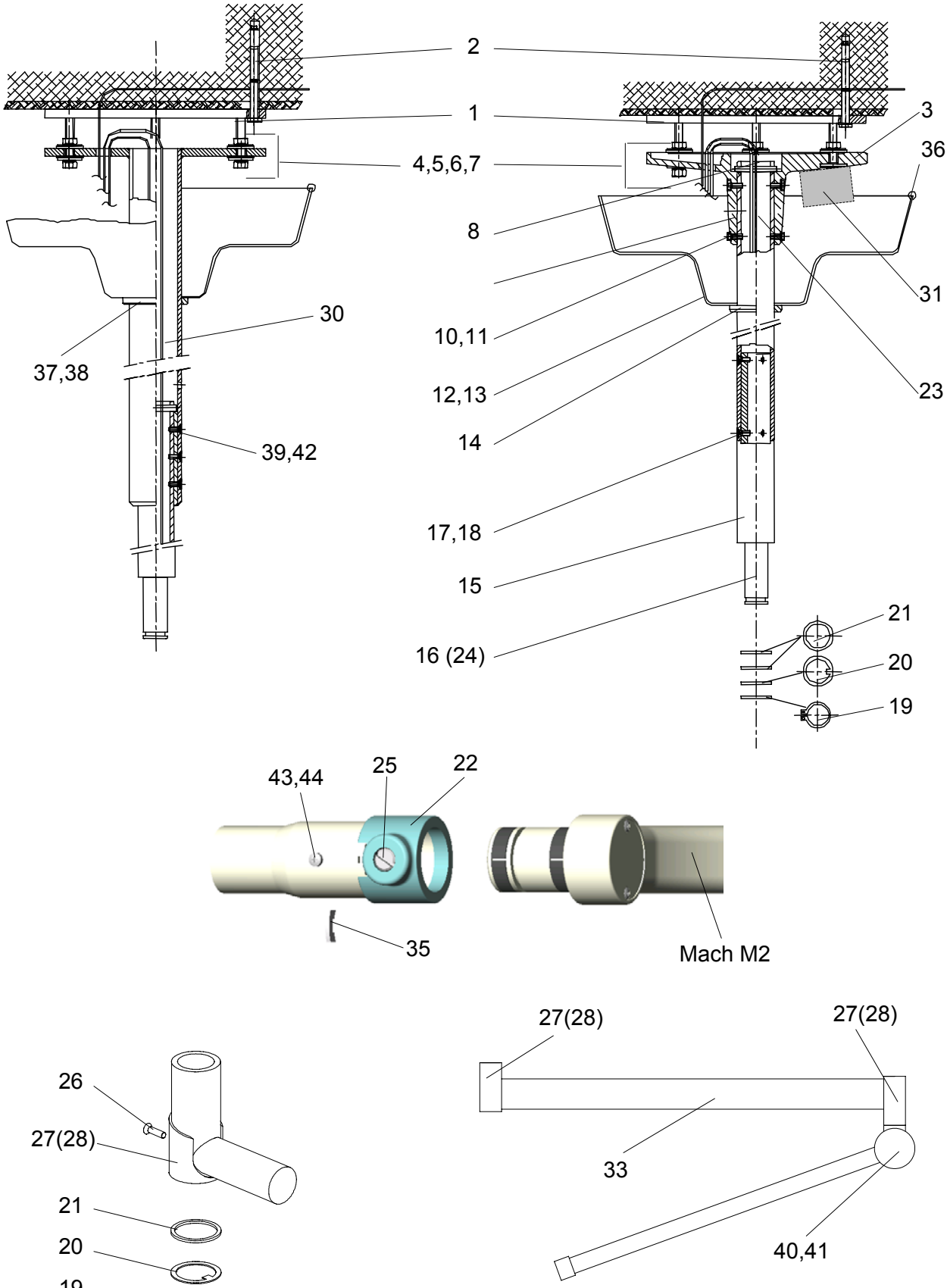
CE

The ceiling attachments comply to the standards 93/42/EEC for medical products of the European Community's Council. Dr. Mach applies the standard EN 60601-2-41.
Dr. Mach GmbH is certified according to DIN EN 46001:1996 and DIN EN ISO 13485:2001.

# 11. Dimensions and range of movement



# 12. Spare parts



# 13. Spare parts list

| Item | Pcs. | Name | EDVNO | Remarks |
|---|---|---|---|---|
| 01 | 1 | Ceiling anchoring ring TK 270 | 50480001 | |
| 02 | 6 | Safety dowels for ceiling anchoring ring | 74011018 | |
| 03 | 1 | Ceiling flange TK 270mm | 50482301 | |
| 04 | 12(24) | Nut M12 DIN 934-8 galZn | 65332023 | ( ) with int. flange |
| 05 | 12 | Washer 13 DIN 9021 galZn | 65272001 | |
| 06 | 12 | Insulating washer | 50281222 | |
| 07 | 6(12) | Blocking washer SK12 galZn | | ( ) with int. flange |
| 08 | 1 | Safety bolt | 50753203 | |
| 09 | | | | |
| 10 | 6 | Hexagonal head screw M6x16 DIN 933 | | |
| 11 | 6 | Retaining ring B6:A2 DIN 127 | | |
| 12 | 1 | Canopy 50/450 | 50222203 | optional |
| 13 | 1 | Canopy, divided 50/450 | 50222208 | optional |
| 14 | 1 | Ring 50mm | 50222202 | |
| 15 | 1 | Suspension tube 50x4 | 50221001-<br>50221028 | Length 180mm to 1500mm |
| 16 | 1 | Sliding contact socket (3-pole) | 67330001 | Not shown |
| 17 | 6 | Countersunk screw M6x16 DIN 7991 galZn | 65162006 | |
| 18 | 6 | Cover, white | | |
| 19 | 1 | Circlip (Seegerring) | 74011014 | |
| 20 | 1 | Gib washer | 74011013 | |
| 21 | 1 | Levelling washer | 74011012 | |
| 22 | 1 | Securing sleeve | 74013012 | Ondal 1502738 |
| 23 | 1 | Connecting cable 680-2000mm | 50224001-<br>50224028 | |
| 24 | 1 | Sliding contact complete | 50223001-<br>50223028 | Pos. 16 + Pos. 23 complete |
| 25 | 1 | Brake screw | 74015007 | |
| 26 | 2 | Screw for cover M3x4 DI´N 966 | 65112029 | |
| 27 | 2 | Cover | 74015022 | |
| 28 | 2 | Sliding contact for new-type swing | | Ondal T19694 |
| 29 | | | | |
| 30 | 1 | Flange tube ∅ 70mm | 50751001-<br>50751008 | Length 300mm to 1000mm |
| 31 | 1 | Transformer 130VA 230V | 67010202 | At the flange |
| 32 | | | | |
| 33 | 1 | Spring arm 4-5 kg, complete | 74861005 | |
| 34 | | | | |
| 35 | 1 | Securing segment | 74015006 | |
| 36 | 1 | Cellular rubber seal, length 1430mm | 50222209 | |
| 37 | 1 | Ring | 50754201 | 50754001 |
| 38 | 1 | Washer | 50754202 | |
| 39 | 1 | Bolt ∅8x59 | 50753202 | |
| 40 | 1 | Lateral cover, left | 74015010 | Ondal T37284 |
| 41 | 1 | Lateral cover, right | 74015011 | Ondal T38505 |
| 42 | 2 | Cover, white | | |
| 43 | 1 | Screw M3x10 D7985:Zn | 65152045 | |
| 44 | 1 | Lock washer A3,2 | 65582003 | |